Criterion 6 Indicator 30: Value and quantities of production of non-wood forest products.

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I. Indicator presentations

A. Rationale for use of the indicator:

1. Rationale from the Section of the Montreal Process Technical Advisory Committee (TAC) notes on Indicator 30:

This indicator measures trends in the value and quantities of non-wood products derived from the forest that may be economically important to indigenous people and local communities. Cultural, social or spiritual values are monitored under other indicators.

2. Interpretation from the TAC:

Interpretation should relate to the management objectives that have been identified for the non-wood products, where applicable. The value of non-wood products may fluctuate due to changes in general economic conditions or societal preferences.

3. U.S. clarification of the indicator and additions to rationale:

- There is large-scale (industrial) production for some non-timber forest products (NTFPs).
- The derived values for non-timber forest products should be consistent with the process of derived values for timber products.
- Nontimber forest products are economically important beyond the interests of indigenous people and other local communities. This indicator should cover all activity associated with nontimber forest products.
- There should be reference to Indicator 14.
- The TAC interpretation of this Indicator refers to management objectives, but there are no national-scale management objectives sanctioned in the U.S. for this (or any other) indicator.

B. Data available to quantify the indicator.

Nontimber forest products include many plants, lichens, and fungi from forests, including understory species used in floral markets, for seasonal greenery, as wild foods, for medicinals, as plant extracts, and for transplants. Posts and poles, firewood, and Christmas trees are all significant secondary tree products in many regions. Game animals in U.S. forests are an important source of food to many people. As the number of people desiring naturalness both in an ecological and a cultural sense grows, the demand for and the value placed on these natural products increases.

Annual or regularly collected data on domestic production and prices for NTFPs are generally not available. Information about game animal and fur-bearer populations and harvest is collected by State and Federal agencies, but national information is not generally available for all species. Prices for many NTFP in the U.S. are influenced by international supply and demand, by seasonal fluctuation in availability, and by rising domestic demand. There have been estimates, based on surveys or other means, of the scope of various segments of the NTFP industry, particularly in the Pacific Northwest. We will discuss NTFP by several categories: 1) medicinals; 2) food and forage species; 3) floral and horticultural species; 4) resins and oils; 5) arts and crafts; 6) secondary wood products such as posts and poles; and 7) game animals and fur bearers.

National legislation does not explicitly state that nontimber forest products will be addressed in forest planning. However, among 32 eastern forest plans examined by Chamberlain and others (2002), seven addressed NTFPs to some extent. No National Forest plan devoted more than one percent of its text to NTFPs.

1. Medicinals

Data on the size of the medicinal market are limited, but global markets are well developed (Lewington 1993). The medicinal market is composed of two sectors, the phytopharmaceutical and the botanical or herbal. The herbal medicinal sector, which provides dietary and herbal supplements and alternative health care, is increasing rapidly in size and diversity (Foster 1995). Brevoort (1998) provides the best overview of the dramatic change in the U.S. in consumption of medicinal plant products. Between 1996 and 1998, national retail sales of medicinal plant-based products rose from $1.8 billion to $4.0 billion. Most of the increase comes from value-added processing, from fresh herb sales to standardized extracts and phytomedicines. From July 97 to June 98, the three most significant native species in terms of sales were American ginseng (*Panax quinquefolius*) at $138 million, *Echinacea* species at $33 million, and saw palmetto (*Serenoa repens*) at $27 million. Other prominent native species in the market are goldenseal (*Hydrastis canadensis*), black cohosh (*Cimicifuga racemosa*), and cranberry (*Vaccinium* spp.). St. Johnswort (*Hypericum perforatum* L.), originally from Europe, is frequently found in the west (Whitson and others, 1999). It is listed as one of the medicinals for which the USDI Bureau of Land Management (BLM) issues harvesting permits (Table 1). Of the 25 top selling botanicals in U.S. commerce, over 50% are plant species native to the U.S. In 1998, retail sales of commercial herb species at $688 million were 57% higher than in 1997 (figures unadjusted for inflation). 1999, however, did not see another increase (Blumenthal 1999). These market figures are the result of a combination of wild harvests, wild-simulated agriforestry operations, and domesticated native species grown in agricultural environments.

The number of fungi species in the American medicinal marketplace is much smaller than the number of plants species. Among lichens, only *Usnea barbata* or other related *Usnea* species appear commonly in U.S. herb stores. Chinese and Japanese medicine practitioners in the U.S. introduced medicinal applications of fungi to the American public, and presently numerous firms are actively marketing fungi species for specific treatments (Alexander and others, 2002).

2. Food and forage species.

Most categories in the United States Harmonized Tariff Code (HTC) system identifiable to species or to species groups refer to food. Of all the native fruit products explicitly named in the HTC codes, blueberries (*Vaccinium* spp.) have the largest number of classifications. The HTCs distinguish between wild and cultivated blueberry crops, and whether crops are exported fresh, frozen, canned, or dried. Most fresh wild blueberry exports come from northern New England and New York. The major export species is *V. angustifolium*. Exports of fresh wild blueberries have remained somewhat constant since 1993 at less than 1,000 metric tons, with the largest share going to Canada. The only exception was in 1994, when exports amounted to more than 4,000 metric tons. The shift to exporting frozen products has also extended to wild blueberries. Most frozen blueberries are exported from Portland, ME, and the total value has been about $8 million per year. Dried wild blueberries are a small part of the market, amounting to less than $1 million annually. Canned wild blueberry exports rose steadily between 1993 and 1997, with about $4 million in sales in 1997. Japan is the largest importer of canned wild blueberries (Alexander and others 2002). In 1996, black walnut harvesters in the east were paid more than $2.5 million (Chamberlain and others 2002).

Maple sugar and maple syrup (primarily from sugar maple, *Acer saccharum*) are produced in the US; they are consumed domestically and exported. Since 1992, the value of maple product exports has exceeded $3 million annually. Pecans are also consumed domestically and exported. Most production comes from cultivars grown in orchards. Export quantities climbed from 1.5 thousand to 8 thousand

metric tons between 1989 and 1998. The USDA Forest Service (FS) issues permits for tree sap, primarily sugar maple (Table 2).

Blatner and Alexander (1998) outline prices for some of the most significant commercially harvested fungi in the Pacific Northwest. It has been estimated that as many as 36 species are traded commercially but *Boletus*, chanterelles (*Cantharellus* spp.), morels (*Morchella* spp.) and American matsutake (*Tricholoma magnivelare*) make up the bulk of the industry. The average price paid to harvesters in the Pacific Northwest from 1992 to 1996 was $5.69 for *Boletus*, $3.26 for chanterelles, $5.04 for morels, and $14.08 for American matsutake. The size of the wild mushroom market in Washington, Oregon and Idaho was estimated at $21.5 million in 1985 (McRobert 1985), $38.6 million in 1989, and $41.1 million in 1992 (Schlosser and Blatner 1995). Russell (1990) estimated that exports of American matsutake from British Columbia were worth 9 to 10 million in 1989. Mushroom buying may represent the largest cash-based legal commerce in our society. According to Japanese trade records, between 1989 and 1997, American matsutake exports to Japan from the United States climbed from $2.5 to $9.5 million dollars. In 1997, more than 275 metric tons were exported to Japan (Alexander and others 2002). Most wild mushrooms exported to the European Community come from the Pacific Northwest and are shipped from Seattle. Values for chanterelles exported to Europe may be eight to ten times greater per unit of weight than commercially grown *Agaricus* mushrooms and twice the value of chanterelles coming from major producer countries in Europe such as Lithuania and Poland (Weigand 2000). In fiscal year 2000, the BLM issued permits in the west coast states for 52,240 pounds of fungi, with permit sales totaling $15,185 (Table 1). The FS issued permits worth $226,205 (Table 2). Although for some species and in some areas, compliance is relatively high, this total still represents far less than the total western mushroom trade.

Forage grass species are particularly important to Federal and private land management in California and the Pacific Northwest, Rocky Mountain, and Southwest regions where grazing in or near forest environments is a major land use activity and where native range restoration is a goal. Common native grass species are available commercially and provide valuable forage for domesticated animals and wildlife species. Native grasses, legumes, and clovers are used for range reclamation and restoration. Mesquite (*Prosopis* spp.) is important forage for animals in Texas and the Southwest. Some commercial grass forage species such as Indian ricegrass (*Achnantherum hymenoides*) are traditional staple crops of Native Americans. Programs for seeding lands with native forage accomplish two important elements of Federal trust responsibilities to recognized Indian tribes: restoring ecosystems with traditional food species and providing high-quality forage for native game species such as buffalo and pronghorn antelope (Alexander and others 2002). Forage and hay permits are significant on BLM and FS lands. The BLM sold permits for 547 tons of forage in 2000, and the FS sold permits for grass worth $161,332 (Tables 1 and 2).

3. Floral and horticultural species

Christmas trees are an example of an NTFP that has been increasingly cultivated in the United States. Some people in the US go out in the forest and harvest their Christmas tree. Many landowners have designated areas and issue permits, but some landowners still experience problems with theft of small trees from replanted areas. Climate conditions provide the major divisions for availability of Christmas trees in various regions of the US. True firs (*Abies* spp.), spruces (*Picea* spp.), pines (*Pinus* spp.), and Douglas-fir (*Pseudotsuga menziesii*) are the major Christmas trees in all regions except in California, the Southeast, and Florida. In California, redwood (*Sequoia sempervirens*) and giant sequoia (*Sequoiadendron giganteum*) are major Christmas tree species. In the Southeast and Florida, eastern redcedar (*Juniperus virginiana*) is one of the two most important Christmas trees regionally. Tradition and cultural use also influences Christmas tree use. Eastern redcedar is common as a Christmas tree only as far north as Virginia although the species ranges on the Atlantic seaboard north to southern Maine. People in interior Alaska are accustomed to harvesting black and white spruces (*Picea mariana* and *P. glauca*) for personal use from public lands without charge or regulation. In the Southwest, juniper (*Juniperus* spp.) Christmas trees cut on rangelands helped to reduce woodland encroachment. In the West, Mid-West, and Northeast, public land managers also permit individuals to cut trees for personal use with no or minimal charge (Alexander and others 2002). In fiscal year 2000,

the BLM sold permits for 17,861 Christmas trees (Table1) and the FS sold permits for 230,252 Christmas trees (Table 2).

A tremendous variety of native plant, lichen and moss species supply commercial foliage, stems, branches, fruits other vegetation for use in the winter holiday season and in the year-round floral industry. The harvest and use of native species has a strongly regional character, particularly for the species that people wildcraft. Species availability and use can change rapidly with changes in taste and with the introduction of new items to the marketplace.

The NTFP industry has been in existence in the Pacific Northwest since the early 1900s, and in the east and south for much longer. The industry will likely remain an important component of regional economies for years to come, although individuals product markets will increase or decrease from year to year depending on changing market conditions and resource availability (Alexander and others 2002). Cronemiller and others (1950) and Shaw (1949) estimated that all NTFP contributed about $5 million to Oregon's economy in 1950. Schlosser and others (1991) estimated the size of the floral and Christmas greens markets in Washington, Oregon and southwest British Columbia at $128.5 million in 1989, and Blatner and Schlosser (1997) estimated it at $106.8 million in 1994.

In fiscal year 2000, the BLM issued permits for 340 tons of boughs for $25,435, 467 tons of floral greenery for $1,902, and 68 tons of moss for $4,514 (Table 1). In the same year, the FS issued permits for boughs for $282,011 and for floral greens for $490,918 (Table 2). Permit prices usually represent ten percent or less of the shed (the first buying level) value for the product. As with mushrooms, there is a great deal of harvest that takes place without a permit. Historically, permits were not required for many of these products. Permit sales are a good indicator of relative market size and movement, but are not reliable for determining total harvest.

There are numerous conifer species used in both the holiday greens and the floral markets. Table 3 gives an idea of the range of prices across species and from year to year. The demand for Christmas greens changes less than the demand for floral products, as the Christmas greens market is based on traditions that change little from year to year.

Table 4 outlines prices paid to harvesters for selected floral greens in the Pacific Northwest. The species in Table 4 have been important in the Pacific Northwest since the market began there, but the volume of use and the way the products are utilized changes. For example, since these prices were collected, a size category called "shorts" for evergreen huckleberry (*Vaccinium ovatum*) and salal (*Gaultheria shallon*) has become common, and new markets are being developed for deciduous red huckleberry (*Vaccinium parvifolium*) brush.

Since 1992, the value of moss and lichen exports has been increasing steadily. Most of the increase has been taking place in customs districts in the Pacific Northwest and New York. The major point of export for moss and lichen products en route to Europe is by way of New York, particularly in winter when air temperature has less effect on product freshness. At least $13 million worth of moss and lichen was exported from the Pacific Northwest in 1998. The amount of biomass cannot be estimated from the HTC data. Exports of foliage and branch products, primarily to The Netherlands, Canada, and Germany, were fairly stable from 1989 to 1998. Many of the species grown in Florida are exotics grown agriculturally, but species exported from the Southeast and the Pacific Northwest are wild-growing, mostly native species (Fisher 1992). Since 1993, the real value of exports stabilized at around $20 million annually.

4. Resins and oils

This section synthesizes current information on plant and lichen species native to the United States and its territories used as fragrances and flavors. Products derived from native plant species fall into several broad categories. Industrial chemists use aromatic plant compounds in air fresheners, bath products, diffusors, hair- and skin-care products, inhalants, massage oils, and perfumes. Food flavorists also use many of these same essential oils to flavor foods or to impart a combination of

fragrance or flavor to pharmaceuticals. A few species native to the United States have a long tradition of commercial industrial uses as fragrances and have international markets: eastern arborvitae (*Thuja occidentalis*) and eastern redcedar, for example. Other species such as wintergreen (*Gaultheria procumbens*) and sassafras (*Sassafras albidum*), although native to North America, are increasingly grown commercially in other countries, in particular China and Vietnam. Many other species native to the United States and its territories are no longer produced commercially because costs of labor and production are prohibitive to commercialization (Bauer and others 1997). Certain common species such as balsam fir are still wildcrafted in the Northeast and the northcentral states. A partial list of species native to the US used for essential oil production in North America includes balsam fir (*Abies balsamea*), sweet birch (*Betula lenta*), alligator juniper (*Juniperus deppeana*), eastern redcedar, Labrador-tea (*Ledum groenlandicum*), black spruce, eastern white pine (*Pinus strobes*), goldenrod (*Solidago canadensis*), northern white-cedar (*Thuja occidentalis*), and eastern hemlock (*Tsuga canadensis*). The range of species currently used in the perfume industry is narrow, particularly when only North American species are considered. By contrast, resins and oils are important NTFPs in the United States. Moerman (1998) provides a comprehensive summary of native plant species used as fragrances and incense that have subsistence and cultural importance. Conservation of many of these species is important for land managers and landowners, especially in areas that comprise ceded lands or customary use lands as defined in treaties between the U.S. Government and sovereign Indian tribes. Opportunities exist for entrepreneurs interested in gathering, buying and distilling plants and lichens from US forests. Numerous native species are grown elsewhere and used for oil production; there are still unexplored US native plants with possibilities for oil production (Alexander and others 2002).

Most of the production of cedar oil exported from the United States is from eastern redcedar and alligator juniper. Some cedar oil from western redcedar (*Thuja plicata*) in the Pacific Northwest and from eastern arborvitae in the Upper Midwest may also be exported, but most production of oils from these two species comes from Canada. Unfortunately, clear conclusions about cedar oil export data not possible because the same HTC code in the United States includes nutmeg oil and clove oil. Pine oils can be produced from the foliage and bark of numerous pine species in the United States; most comes from the Southeast, where pines are major timber species. Pine oil is a byproduct of the nontimber biomass from whole tree harvesting. Most exports leave by way of the Charleston, Savannah, Miami, and Tampa customs districts. The two major trading partner nations are Canada and the United Kingdom. Total export value and quantity have fluctuated between $6 and $9 million between 1989 and 1998. Production of turpentines from gum and wood products, primarily from pine species and long-leaf pine (*Pinus palustris*) in particular, concentrate in the Southeast. Target partner trading countries and ports of departure are different. On the one hand, the Savannah custom's district is the major point of origin for export to France, the major European trading partner. Most turpentine destined for Mexico, the other major trading partner, passes through the Laredo TX customs district. The total values of exports of turpentine differ considerably from year to year (between $3 and $8 million) and the total value is usually less than that of pine oil exports (Alexander and others 2002).

5. Arts and crafts

The use of nontimber forest products in arts and crafts is an integral part of innumerable traditions in the United States. From Native American use of bark, willow and branches in baskets, masks, traditional and ceremonial dress, to doll-making and baskets in the Appalachians, to furniture, birdhouses, bowls and other well-known and admired Shaker products, the plants used are as varied as the products created. Many sources have documented the use of nontimber forest products in arts and crafts (e.g., Emery 1998; de Geus 1995). An internet search yields many sites for basket weaving, basket making supplies, crafts, and cane chairs, to name a few products. Although many of the plant materials used in arts and crafts come from India, there are products in the US that are unequalled anywhere else in the world, such as the pine cones from sugar pine (*Pinus lambertiana*) and western white pine (*Pinus monticola*). The U.S. Bureau of the Census (1993) projected the value of the handicraft industry at $600 million in 1996. People harvest burls, hobby wood, cones, and other products from public lands (Tables 1 and 2). The arts and crafts markets have experienced great increases in demand. As many of the products are created in rural communities and are traded or sold without records, information about these markets has not been summarized. In addition, the diversity

of products makes these markets difficult to track as a group. It should be acknowledged, however, that these are significant products that contribute in important ways to household economies and have important meaning across US cultures (Alexander and others 2002).

6. Secondary wood products

The demand for most types of wood products is covered in other Indicators. However, Table 1 gives a glimpse into the demand for many types of wood products that are not always obvious when data is summed for all types of wood and fuel use. Fuelwood is a significant resource gathered from public lands. Permits for fuelwood sold by the BLM are significant in all western states that have BLM lands, from Alaska to New Mexico. The BLM sold 1,601,935 cubic feet of fuelwood permits for $110,311, and 560,686 cubic feet of poles and rails for $20,228 in fiscal year 2000. Posts and poles are a significant category, from small poles to house logs. Many people rely of public lands as a source of fuelwood, and many small businesses survive on the harvest and sale of posts and poles.

7. Game animals and fur bearers

Ecosystems in the United States support some of the most diverse temperate forests, warm deserts, and shallow-water wetlands found in the world (Ricketts and others 1999). The composition and configuration of wildlife habitat is fundamentally affected by land use activities. Changes in land use affect changes in wildlife populations and harvests. Land use changes most likely to significantly affect wildlife populations and harvests include the increase in urban and built-up land, the retirement of cropland acreage into the Cropland Reserve Program, changes in forest successional stages, the extensive loss of grassland habitats, and the continued loss of wetland habitats. Based on these changes, Flather and others (1999) expect increase in species that tolerate intensive land use activities, increases in species associated with agricultural habitats, decreases in species associated with grasslands and early successional stages of forest habitats (especially in the north), and general declines in species dependent on wetlands.

Recreation values for hunting, fishing, and wildlife viewing are outlined in Table 5. Rosenberger and Loomis (2001) summarized numerous studies that examined the recreational value of many activities, including hunting, fishing, and wildlife viewing. The number of people who take trips for the primary purpose of viewing, photographing, or feeding wildlife is substantial. In 1996, nearly 24 million people participated in wildlife watching. Although it is more common to participate in nonconsumptive recreation than to hunt, the rate of decline in wildlife viewing exceeds that of all types of hunting (Flather and others 1999).

Following Flather and others (1999), this discussion will address game animals and fur bearers by major species categories, including: big game, small game, migratory game birds, and furbearers.

Big game: Big game are primarily large mammal species taken for sport or subsistence. Wild turkeys (*Meleagris gallopavo*) are included in this category. Since 1955, trends in wildlife-oriented recreation activities have been monitored by the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Participation in big game hunting has increased in every survey period since 1955. Both the number of hunters and the time devoted to hunting has increased. More days are spent hunting big game than any other category of hunting. Wildlife conservation has focused on these species and many are now highlighted as wildlife management successes. Nationally, estimates of big game populations have increased substantially since 1975, including wild turkeys, deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and black bear (*Ursus americana*). Exceptions to the pattern include deer in the West, wild turkey in the Rocky Mountains, and pronghorn (*Antelocapra americana*) in the South. Some of these population numbers are, however, difficult to interpret (Flather and others 1999).

Big game contribute significantly to rural economies through recreational harvests, but overabundant populations of some species can carry significant economic and ecological costs. Conover and others (1995) found that the average repair bill per reported accident for deer-vehicle collisions was $1,577

(in 1993 dollars). When applied to all reported accidents, the total was $1.1 billion. This does not take into account unreported accidents, or human injury or death associated with these collisions.

Small game: The number of small game hunters has declined at a nearly constant rate since the mid-1970s. Based on data from states that can provide both population and harvest data for small game, about 15 to 20% of the small game population is harvested each year, ranging from a low of about 3% for hare (*Lepus* spp.) to a high of 31% for ring-necked pheasant (*Phasianus colchicus*). Recreation values for small game hunting are summarized in Table 5.

Migratory game birds: From 1975 to 1996, there was a steady decline in the number of migratory bird hunters. The most recent survey indicates participation in migratory bird hunting may be increasing. "Migratory game birds" refers to a collection of species that include waterfowl and webless migratory species, such as American woodcock (*Scolopax minor*) and mourning dove (*Zenaida macroura*). Conservation and management is the responsibility of Federal agencies. The primary objective of treaties the United States has with Canada, Mexico, Japan, and the Soviet Union is the protection and conservation of migratory birds. Harvesting in a manner consistent with conservation is a secondary objective. The history of monitoring migratory birds in North America has resulted in the most extensive and reliable estimates of population and harvest in the world (Nichols and others 1995). Population and harvest trends are published annually by the U.S. Fish and Wildlife Service. Flather and others (1999) again provide extensive detail on specific species. Recreation values for waterfowl hunting are summarized in Table 5.

Furbearers: Prices that trappers receive for pelts are a strong determinant of harvest. Peak prices in the late 1970s and the mid-1980s corresponded to peak harvest periods. Average pelt prices show regional variation associated with differences in species composition. After a variable price pattern through the late 1980s in all regions, prices have remained relatively stable since 1990 at levels that are about 60% lower than prices in the late 1970s and early 1980s. In 1987, 1,027 farms raised 4.12 million mink (*Mustela vison*) pelts worth about $177 million ($43 per pelt). There were 362,000 mink trapped in 1987, valued at $7.6 million ($23.26 per pelt). By 1990, 771 farms raised 3.37 million pelts with a total value of $85.8 million ($25.50 per pelt). Trappers in 1990 harvested 142,000 mink with a total value of $3.1 million ($25.38 per pelt). From 1987 to 1990, trapped mink dropped from 8% of the total harvest to about 4% (Flather and others 1999).

C. Limitations of data presented.

Current approaches include analysis and summaries of USDI Bureau of Land Management permit data, industry surveys, USDA Forest Service Sales Tracking and Reporting System (STARS), Harmonized Tariff Code data, State and Federal game harvest information and biological population function estimates, and other data sources and analysis at regional or local levels. Although for some industries, locations, and specific species these analyses may be comprehensive, that majority are incomplete and do not fully represent the range of products. Prominent data gaps include personal use and removals from private lands.

Prominent data gaps include personal use of NTFPs, and production and value from private lands. Determination of value is problematic, as reported value and revenues are from many different retail and wholesale levels. There is no single source of data for NTFPs, nor is it expected that there ever will be. It is unclear how consistent or comparable data sources are in terms of value and scale. Personal use values for NTFPs have not been estimated.

HR2466 Sec. 339, part of the fiscal year 2000 appropriations budget, is titled "Pilot Program of Charges and Fees for Harvest of Forest Botanical Products". The law defines botanical products as florals, mushrooms, etc. removed from Federal forests (excluding wood products), defines "fair market value", and requires that permit fees be based on a determination of "fair market value" and sustainable harvest levels. This law is having a considerable impact on the development of appraisal methods and on commercial nontimber forest product harvesting on federal lands. Proposed Codified Federal Regulations (CFRs) for HR2466 Sec. 339 will be published in the Federal Register in spring 2002.

CTC4 recommended several possibilities to address data needs for this Indicator.

- Compiling existing life history information on NTFPs and providing easy access for potential users.
- Developing life history information for those NTFPs without such data, and focusing on high priority species first.
- Choose several key NTFPs based on ecological sensitivity or economic/social importance, and develop pilot studies to measure both biologically and socially sustainable levels of harvest using the concepts of population biology, social science, economics, and ecology. One goal of the studies would be to address protocol transfer and use for other NTFPs. The pilots would seek to examine sustainability at regional levels and develop ways to summarize them at the national level. Some studies like these are underway; one example is an effort to develop collaborative management and profit sharing in Washington with an agreement between the landowner and an organized group of harvesters. Another is an ongoing study of salal ecology and response to harvest in Washington.
- Current studies may result in suggested changes to Forest Inventory and Analysis (FIA) data collection.
- Protocols for determining sustainability for many NTFP species need to be developed for groups of related species, life forms, or products.
- Further studies on aspects of value for NTFPs, how to assess economic value, and documenting commercial, subsistence, and personal use of NTFPs are needed.

II. Problems related to scientific, social/political, economic, and institutional concerns.

General scientific:

- Need to determine national level of harvest and sustainable level for products.
- There is no regularly collected data on harvest amount (commercial, personal use, cultural and traditional use).
- NTFP species cover every phylum; thus it is hard to make generalizations about suggested inventory and monitoring protocols, regional or national harvest suggestions, land management to optimize production of all species, and so on.
- Need to create unit measures of variability (e.g. weight, volume, counts, etc).
- Need a method to measure annual variation in production of NTFPs.

Social/Political:

- NTFPs are a significant contributor to household economies and income, for which almost no data are collected.
- Access issues and harvest tenure rights have been getting more attention lately; these issues need further exploration.
- Industry is reluctant to release information.
- HR2466 Sec. 339, part of the fiscal year 2000 appropriations budget, titled “Pilot Program of Charges and Fees for Harvest of Forest Botanical Products”. The law defines botanical products as florals, mushrooms, etc. removed from Federal forests (excluding wood products), defines “fair market value”, and requires that permit fees be based on a determination of “fair market value” and sustainable harvest levels. This law is having a considerable impact on the development of appraisal methods and on commercial nontimber forest product harvesting on federal lands. Proposed Codified Federal Regulations (CFRs) for HR2466 Sec. 339 will be published in the Federal Register in spring 2002.

Economic:

- Funds are needed for data collection and pilot studies, and for consolidating NTFP data for all U.S. forests into a national database.
- Significant data gaps need to be filled for adequate measurement of this indicator.

Institutional:

- Historically, NTFPs have not been a very high administrative priority of federal/state agencies. Recent Federal law (HR2466 Sec. 339) means more attention will be focused on Federal public lands.
- There is no one institution that is responsible for this Indicator.

III. Cross-cutting issues and relationships with other Indicators.

A. Cross-Cutting Issues raised by CTC 6:

• The database on values for quantity should be the same for this indicator and Indicators 14, 32, and 34.
• Sources of information include: formal databases, other quantitative information, and qualitative information. Qualitative information is especially important for interpretation of this indicator.

B. Cross-Cutting Issues from Indicator 30 Text:

• The data required for this indicator include those used for Indicator 2. (From I. A. TAC notes)
• There does not seem to be a relevance to indicator 2 as indicated in approaches to measurement in the TAC. There should be a reference to indicator 14 instead. (From I. A.)

C. Cross-Cutting Issues from Other Indicators:

• Output and value measures: 11, 29, 30, 64 (from Indicator 64)
• Total Biomass, All Live Tree Volume, and Growing Stock: 11, 26, 27, 28, 29, 30, 31, 32, 33, 34 (From Indicator 11)
• "Investment affects production and consumption:" 29, 30, 31, 32, 33, 34, 38, 39, 40, 41 (From Indicators 38-41)
• "There is an overlap with Indicators 29, 30, and 32 which would require similar procedures." (From Indicator 44).

D. Other cross-cutting issues:

• Non-wood: 14, 15, 17, 30, 32, 34, 38, 58
• Valuation: 29, 30, 31, 32, 33, 41, 42, 43, 47, 51, 52, 58, 64, 65
• Non-wood Variables: 14, 30, 32, 34

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Table 1. USDI Bureau of Land Management special forest product sales in fiscal year 2000. (Table will be modified when more data are available)

RPA Region	Product	Units sold	Unit measure	Number of permits	Permit sales
Alaska	fuelwood	33,578	Cubic feet	41	$0
	House logs	3,097	Cubic feet	4	$0
California	boughs	50,500	pounds	7	$1,530
	St Johns-wort	200	pounds	1	$20
	Floral greenery	2,776	pounds	8	$238
	fungi	1,600	pounds	29	$975
	Seed cones	70	bushels	2	$44
	fuelwood	40,832	Cubic feet	189	$2,643
	poles	163	Cubic feet	1	$350
Pacific Northwest	boughs	602,983	pounds	202	$23,504
(OR, WA)	Burls, misc	41,715	pounds	32	$5,445
	Hobbywood, misc	679	Cubic feet	8	$86
	Christmas trees	1,112	number	994	$5,237
	medicinals	8,320	pounds	12	$364
	Forage, hay	232	tons	12	$983
	Floral greenery	919,963	pounds	1,153	$48,863
	Moss and lichen	135,717	pounds	89	$4,514
	fungi	50,640	pounds	744	$14,210
	Seed cones	1833	bushels	11	$464
	Native seed	1,000	pounds	1	$80
	transplants	13,583	number	41	$632
	fuelwood	419,066	Cubic feet	1823	$34,245
	House logs	929	Cubic feet	1	$1,710
	poles, rails	557,402	Cubic feet	135	$2,656
	Misc. pulpwood	18,412	Cubic feet	6	$6,844
Intermountain	boughs	38,200	pounds	24	$401
(MT, ID, WY,	Burls, misc	7	pounds	53	$330
NV, UT, CO,	Hobbywood, misc	652	Cubic feet	4	$48
AZ, NM)	Christmas trees	16,749	number	9674	$63,567
	Pinyon nuts	20	pounds	1	$5
	Forage, hay	315	tons	6	$1,380
	Floral greens	10,401	pounds	66	$511
	Seed cones	13,634	bushels	113	$1,454
	Native seed	75,282	pounds	777	$12,816
	transplants	13,662	number	212	$12,215
	fuelwood	1,142,037	Cubic feet	3,902	$73,423
	House logs	87,580	Cubic feet	4	$6,480
	Poles, rails	93,121	Cubic feet	1084	$17,222

Table 2. USDA Forest Service special forest product sales in fiscal year 2000.
(Table will be modified when more data are available)

Product	Units sold	Permit sales
Christmas trees	230,252	$1,328,403
transplants		$185,025
boughs		$282,011
Floral greens		$49,918
bark		$230
cones		$20,315
seed		$8,662
Fruits,berries		$2,990
Tree sap		$3,379
Roots		$465
Fungi		$226,205
Moss		$ 11,775
Herbs		$2,469
Wildflowers		$11,528
Grass		$161,332
Cacti		$50
insects		$100
Misc.		$4,065

Table 3. Mean per-ton prices (current dollars) for Christmas greens harvested in Oregon, Washington and Idaho, per ton (from Blatner and Alexander 1998).

Common Name	Latin name	1989	1994	1995	1996
Douglas-fir	*Psedotsuga menziesii*	200	315	234	338
grand fir	*Abies grandis*	N/A	387	210	580
incense-cedar	*Libocedrus decurrens*	760	634	619	612
noble fir	*Abies procera*	720	540	408	596
western redcedar	*Thuja plicata*	460	406	295	433

Table 4. Mean per-bunch prices (current dollars) for floral greens harvested in Oregon, Washington and Idaho (table from Alexander and others 2002; N/A = not available).

Common Name	Latin name	1950[a]	1972[b]	1989[c]	1994[c]	1995[c]	1996[c]
Beargrass	*Xerophyllum tenax*	N/A	N/A	0.90	0.56	0.44	0.43
Evergreen huckleberry sprays	*Vaccinium ovatum*	0.11 – 0.16	0.35	0.65	0.85	0.68	0.73
Evergreen huckleberry tips	*Vaccinium ovatum*	N/A	0.25	0.37	0.48	0.51	0.56
Red evergreen huckleberry	*Vaccinium ovatum*	N/A	0.35	0.65	0.92	0.66	0.79
Salal sprays	*Gaultheria shallon*	0.11 – 0.16	0.39	0.90	0.98	0.95	1.06
Salal tips	*Gaultheria shallon*	N/A	0.25	0.50	0.72	0.59	0.76
Scotch broom	*Cytisus scoparius*	N/A	0.28	0.40	0.41	0.42	0.51
Sword fern	*Polystichum munitum*	0.10 – 0.16	0.24	0.62	0.77	0.67	0.64
Moss (per lb)	Various spp.	N/A	N/A	0.26	1.74	0.21	0.37

[a] Allen 1950
[b] Douglass 1975
[c] Blatner and Alexander 1998

Table 5. Recreation activity day values per person by geographic location, summary of studies (from Rosenberger and Loomis 2001).

	Northeast studies RPA1		Southeast studies RPA2		Intermountain studies RPA 3		Pacific Coast studies RPA4		Alaskan studies RPA5	
Activity	n	mean	n	mean	n	mean	n	mean	n	mean
Big game hunting	54	45.46	29	35.89	72	43.56	12	40.76	5	52.40
Small game hunting	3	36.73			13	25.75	1	27.37		
Waterfowl hunting	23	32.09	11	17.70	19	37.18	5	33.19	1	60.08
Fishing	43	31.16	13	27.74	42	40.82	15	36.97	1	39.22
Wildlife viewing	56	26.06	39	29.13	39	36.10	15	29.74	7	42.12